



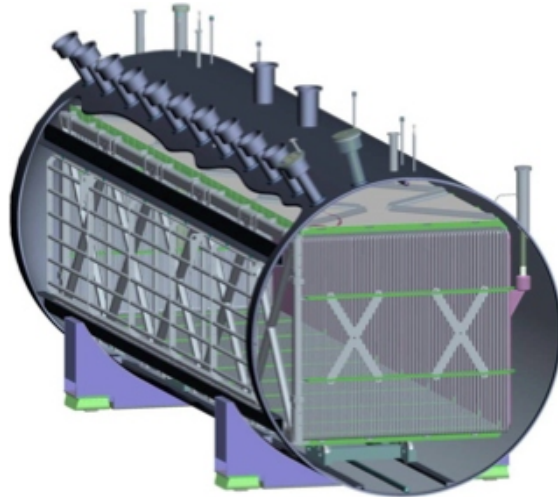
ILLINOIS INSTITUTE
OF TECHNOLOGY



MicroBooNE Update

Ryan Dorrill (IIT)

Proton PMG, All Experimenters Meeting
February 4th 2020





Current Status and Plans



- MicroBooNE to hold its next virtual collaboration meeting next week: Feb 8-12
- In December, MicroBooNE began the first of its R&D studies since entering “safe mode” in March 2020
 - Detector systems and HV were successfully powered and used to take data
 - Remote shifts and operations are continuing for now
- Cryogenics system remains on and is monitored by the Neutrino Division Cryo team
- Regular weekly LArTF walkthroughs continue with run coordinators and ND technical support team
- Filter regenerations for ICARUS and ICEBERG were completed last week using the MicroBooNE cryogenics system at LArTF
- The schedule for the upcoming **R&D phase** is under review by the MicroBooNE Technical Board
 - The initial emphasis is on studies which can be performed remotely, with minimal risk and personnel requirements, and with remote checklist shifts
 - The experiment is not requesting 24/7 neutrino beam. However, if beam is running for other experiments, we can make good use of it in our studies

R&D Phase has Begun

The list of potential R&D proposals includes the following:

- **Study of Single Photo-Electron Rates as a function of High Voltage (Complete)**
- **Testing of the detector grounding scheme for the laser system (requested by DUNE)**
 - **Grounding studies to start in next 1-2 weeks**
 - **No close-proximity work required**
- Xenon Doping of the MicroBooNE Detector (potentially relevant to DUNE's 4th module)
- Radon Doping of MicroBooNE for studies of low energy, MeV scale events
- Study of Single PE rates with reverse HV polarity
- Investigate HV Issues above 70kV (potentially relevant to protoDUNE 'streamer' events)
- Study of Noise from Weiner Power Supply
- Self-triggering studies for DUNE

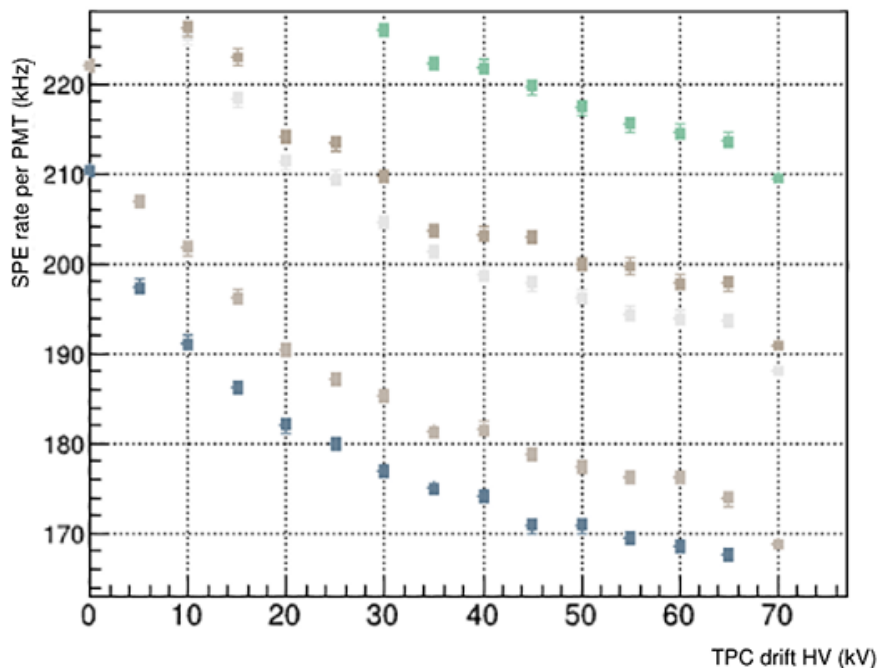


Photo: wikimedia commons



First R&D Study Completed Remotely

SPE Rate Study (Dec-Jan 2021)



- **Study of Single Photo-Electron Rates as a function of High Voltage (HV)**
 - The detector was successfully turned on and took data after the long hiatus
 - Study performed with zero close-proximity work and no on-site access
 - Analysis is still ongoing
 - Initial results indicate ionization as the cause of the noise mechanism (e.g. from cosmics, betas, etc.)
 - Results to be published as part of a broader, light-based paper



Data Processing



Data production continued over the holidays, including over 750,000 jobs last month

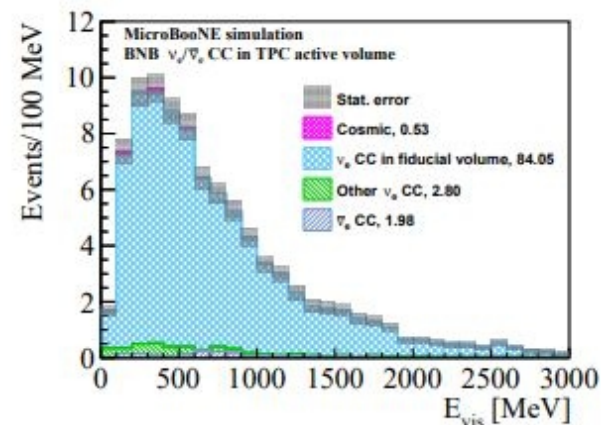


Publications



Many New Publications Have Been Submitted!

- “Cosmic Ray Background Rejection with Wire-Cell LAr TPC Event Reconstruction in the MicroBooNE Detector”, arXiv:2101.05076, submitted to PRD (plots at right →)
- “Measurement of the Flux-Averaged Inclusive Charged Current Electron Neutrino and Antineutrino Cross Section on Argon using the NuMI Beam and the MicroBooNE Detector”, arXiv:2101.04228, submitted to PRD
- “Measurement of the Atmospheric Muon Rate with the MicroBooNE Liquid Argon TPC”, arXiv:2012.14324, submitted to JINST
- “Semantic Segmentation with a Sparse Convolutional Neural Network for Event Reconstruction in MicroBooNE”, arXiv:2012.08513, submitted to PRD
- MicroBooNE had **fourteen publications** last year, and **19 public notes**
 - Eight new publications are also now submitted, awaiting review!



(a) Event spectrum for simulated ν_e CC interactions.

